USDA

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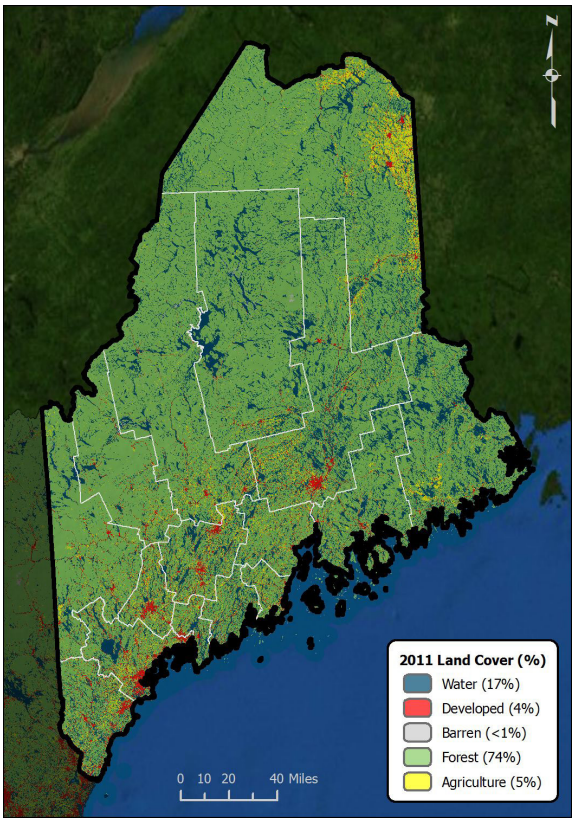
2015 Forest Health highlights

MAINE

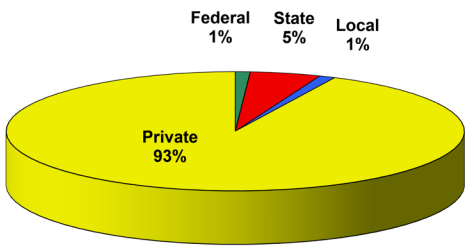
Forest Resource Summary

Ownership of Maine's forested land area has remained stable since 1960. Almost all—approximately 93 percent—of the forest lands are privately owned, the majority being commercial timberland. Public ownership including some reserved lands has remained below 8 percent of the total forested area. The 1 percent that is federally owned encompasses the eastern portion of the White Mountain National Forest, most of which is in New Hampshire, and Acadia National Park. The 2014 Maine forest inventory estimated that there are approximately 17.6 million forested acres in the State. The forest resource is made up of a variety of forest species, of which over half is spruce and balsam fir; the other half is maple, pine, hemlock, birch, beech, oak, and other hardwoods and softwoods.

Maine's forests provide much of the raw materials to fuel the State's mills and serve as the backdrop for the recreation industry. The State's forests also provide watershed, environmental, wildlife, and recreational benefits. Forested parks and individual shade trees provide similar amenities in urban and suburban settings.



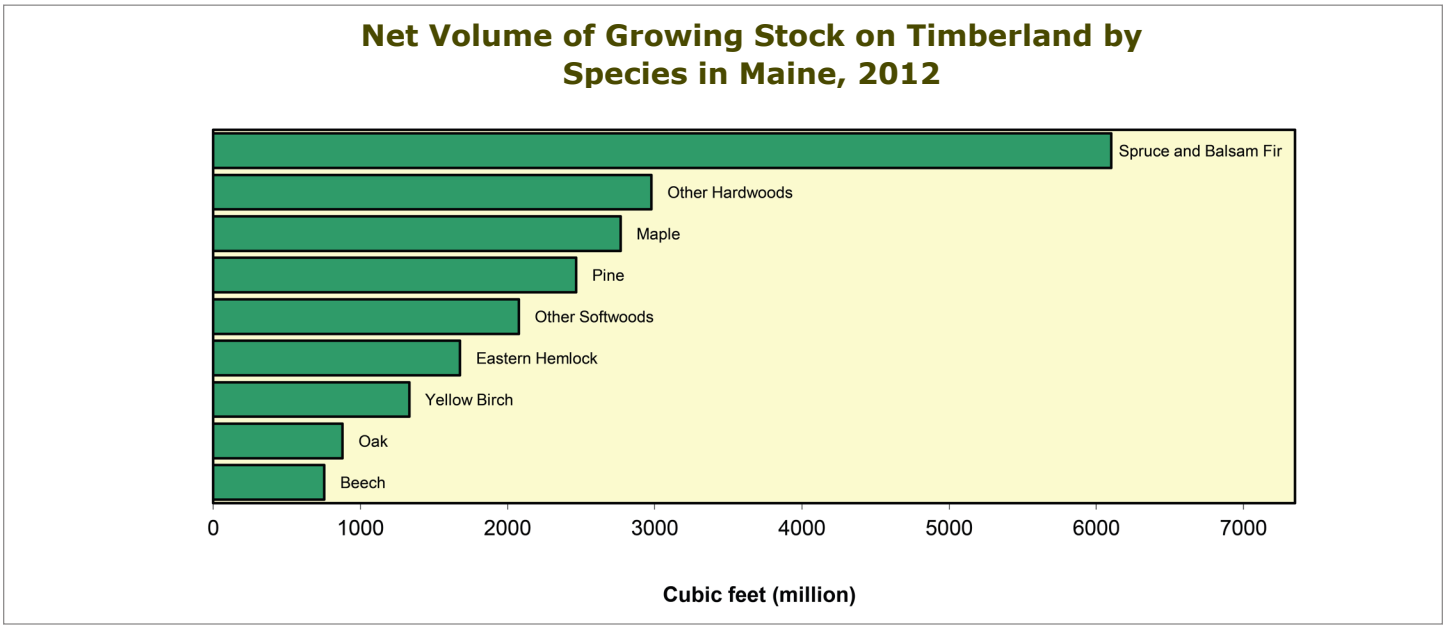
Forest Land Ownership in Maine, 2012



Forest Service
Northeastern Area
State and Private Forestry

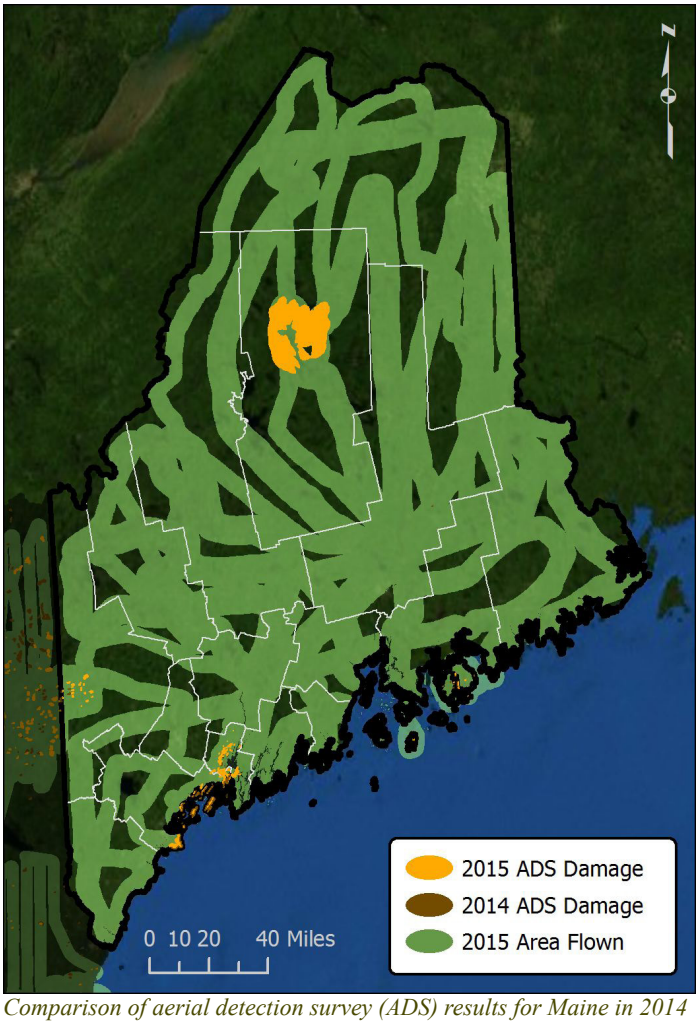
Maine Department of Agriculture
Conservation and Forestry
Maine Forest Service

April 2016



Aerial Surveys

Aerial detection surveys were flown over 15.1 million acres in Maine in 2015. Almost 239,000 acres of damage were mapped—a considerable amount more than in 2014. The largest part of that (213,614 acres) was branch flagging on white pine from pine leaf adelgid in Piscataquis County. The remaining 25,250 acres, still significantly higher than the 3,000 acres mapped in 2014, were mostly defoliation from browntail moth (11,520 acres) and winter moth (10,268 acres). Also, 3,093 acres of white pine needle damage were mapped and 370 acres of red pine mortality from red pine scale.



Comparison of aerial detection survey (ADS) results for Maine in 2014 and 2015 (Map: U.S. Forest Service)

Forest Damage

Diseases

Caliciopsis Canker of White Pine

Caliciopsis canker (*Caliciopsis pinea*) is a disease that has been historically associated with overstocked, pole-sized white pine stands of low vigor. More recently, it has been observed to be more aggressive in some situations, so a reexamination study of the disease was initiated, with the USDA Forest Service, New Hampshire Division of Forests and Lands, Maine Forest Service, and the University of Maine as cooperators. The survey and research effort is ongoing in both Maine and New Hampshire. A summary of only the Maine Forest Service efforts are outlined here.

In 2014, 22 randomly selected stands were surveyed in Maine, and *Caliciopsis pinea* was identified on white pine regeneration from 16 stands. Caliciopsis symptoms in overstory trees were also identified in 16 stands, but not always from those with infected white pine regeneration. Relationships between tree stress resulting from the white pine needle disease complex, and the incidence and severity of caliciopsis canker have not been established but may become apparent as studies continue.

In 2015, the study was expanded to assess caliciopsis canker incidence and severity as it may be related to soil type characteristics. An additional 16 white pine stands were surveyed for the canker disease in Maine, and the data will be combined with similar data collected in New Hampshire by USDA Forest Service and New Hampshire Department of Resources and Economic Development personnel. Of the 16 plots surveyed in Maine this year, fruiting of the pathogen was found on sapling-sized white pines in 10 of the stands. Symptoms of pitching (pitch streaks along the main bole) were observed in all 16 stands. Percentage of white pines exhibiting pitching ranged from a low of 10% in a stand in Lyman to73% in a stand in Shapleigh. Although pitching is one criterion for assessing infection by caliciopsis, not all pitching is likely the result of infection by this pathogen. Detailed canker analyses are being conducted by University of Maine, other State, and USDA Forest Service cooperators, to determine the reliability of using pitching as a survey tool for this disease.

White pine with internodal pitch streaks on the bark—a symptom of infection by Caliciopsis pinea*, in Limington, ME (Photo: Maine Forest Service)*

White Pine Needle Cast and Needle Blight

The needle disease complex that has resulted in extensive premature needle shedding in white pines over the past several years continued at a similar level of intensity in 2015. Losses of 1 year-old needles during late May and through June resulted in numerous disease clinic requests for assistance. This is believed to be the 9th consecutive year of heavy needle loss in Maine from this disease complex. As part of a region-wide study coordinated by USDA Forest Service personnel, two permanent plots in Maine were again assessed for white pine needle disease symptoms. The disease complex was also noted when conducting the survey for *Caliciopsis pinea* (described above in this report). The needle disease remains widespread but is most severe throughout central, western, and southern Maine. An extensive survey in Downeast and northern regions of Maine indicated disease presence wherever white pine was found, but disease intensity in these regions was judged to be considerably less than in southern and western areas.

Yellow needles in Augusta, ME, in June is a symptom of the needle disease complex that has been affecting eastern white pine in the region. (Photo: Maine Forest Service)

Other Disease Issues of Note

In an upcoming issue, Plant Disease is set to publish a first report of the pathogen ***Diplodia corticola*** in Maine. Symptoms of oak dieback were observed in Standish (Cumberland County) and a few surrounding towns in 2015. Symptoms include the drying and death of leaves and branch tips, often with a clearly delimited canker separating the dead portion from the live portion of the branch. Leaves on affected branches become brown and persist on the tree, at least for several weeks. Occasionally, twigs of branches more proximal to the stem are affected first, rather than those at the branch tip. Although no positive identification was made on material from Standish, it is likely that the causal agent for this dieback is *Diplodia corticola* (=*Botyrosphaeria corticola*). This disease is generally considered to be a secondary agent, affecting trees initially weakened or damaged by some other cause. The article "First report of *Diplodia corticola* causing decline of red oak (*Quercus rubra*) trees in Maine" can be found at the American Phytopathological Society journals Web site: http://apsjournals.apsnet.org/doi/abs/10.1094/PDIS-09-15-0994-PDN.

Sirococcus shoot blights remain notable in Maine, particularly ***Sirococcus conigenus*** on red pine and ***Sirococcus tsugae*** on hemlock. Red pine in both natural and planted stands have significantly declined, and mortality occurred in locations scattered throughout the State, due at least in part to *S. conigenus*. Hemlock regeneration has been compromised by *S. tsugae* in scattered locations in Maine, especially in coastal areas.

Insects

Spruce Budworm

Spruce budworm is a periodic major pest of fir and spruce in Maine. The Maine Forest Service has been monitoring this insect since the early part of the last century. Since 1992 we have been using pheromone traps, and catches have averaged well below 5 moths per trap across the northern part of the State. In 2011 that average crept up to over 5 moths per trap, and this year the average is 27 moths per trap--up slightly from 25 moths per trap in 2014. All of the sites had some spruce budworm moths.

Spruce budworm pheromone traps are hung in spruce-fir stands that are more than 25 acres and have at least 50 percent pole-sized or larger trees. (Photo: Maine Forest Service)

For the second year the Maine Forest Service has asked owners and managers of large land areas in northern Maine to help survey for spruce budworm by setting out pheromone traps on their lands. We request one three-trap sample per 6-mile-square township, with traps set in at least a 25-acre spruce-fir stand that is composed of more than 50 percent pole-sized or larger trees. This year 19 entities participated in setting out over 1,300 traps at 452 sites. An additional 129 traps used in a research project were included in the tally as well.

The overall average catch was 25.7 moths per trap with 98% of the traps positive for spruce budworm. The townships with the most moths are in Aroostook and Piscataquis Counties. The number of traps with over 100 moths has gone from 6 in 2014 to 17 in 2015, and the number of traps with over 50 moths has doubled.

Table 1. Average number of spruce budworm moths per pheromone trap, by county, in 2014 and 2015

County	2014	2015
Aroostook	25.8	44.9
Franklin	0.8	0.5
Hancock	2.4	4.9
Oxford	1.1	1.3
Penobscot	6.1	15.1
Piscataquis	10.7	20.4
Somerset	13.2	6.2
Washington	3.2	7.1
Grand total	**15.7**	**25.7**

No spruce budworm damage was detected in either ground or aerial surveys. The University of Maine spearheaded an overwintering larval survey (called L2 for the larval instar collected). Land managers had crews take three midcrown branch samples from 100 of the most at-risk sites. Branch samples were sent to Canada for processing. Eight larvae were found, all in Aroostook County.

Table 2. Number of spruce budworm larvae found in 300 branch samples in winter 2014 – 2015

Town	Larvae
Westmanland	3
St. Francis	2
T14 R13 WELS	1
T14 R8 WELS	1
T12 R12 WELS	1

Maine is poised at the beginning of another spruce budworm outbreak. Outbreaks occur on roughly a 40 year cycle in response to maturing forest stands and reduced pressure from parasites; the last time budworm was a problem in Maine was in the 1970s and 1980s. This native defoliator of balsam fir and spruce has been defoliating trees in Quebec north of the Saint Lawrence Seaway for more than 10 years. Defoliation, which has spread to the south shore, currently affects more than 15 million acres. In New Brunswick numbers of budworm moths in pheromone traps increased, and light defoliation may be seen in the northern part of the province in 2016.

Winter Moth

Winter moth is firmly established along the southern coast of Maine from Kittery (York County) to Bar Harbor (Hancock County) and on many offshore islands. Although more acres of defoliation were mapped this year than last, the intensity was not as severe—many trees were not as heavily defoliated as last year, but the footprint was broader across the landscape. In ground surveys defoliation ranged from light to heavy, from Kittery to Rockland (Cumberland, Knox, Lincoln, Sagadahoc, and York Counties). Heaviest damage was in Cape Elizabeth, Peaks Island in Portland, Harpswell and Chebeague Island (Cumberland County). Total area mapped by aerial survey was 10,264 acres, all in Cumberland County.

The Maine Forest Service ran a pheromone trap survey in December 2014 to determine where winter moth populations were heaviest and to delineate the outer reaches of the infestation. Traps were deployed at 75 locations in towns along the coast and along a transect that extended inland from known infested areas. The survey covered coastal portions of York, Cumberland, Sagadahoc, Lincoln, Knox, Waldo, and parts of Hancock, Androscoggin, and Kennebec Counties. At the same time, reports of moth observations were solicited from the public using an online survey, and over 700 reports were received. A map predicting intensity of defoliation was produced from these surveys to help green industry professionals and homeowners prepare for the growing season.

Winter moth damage spotted from aerial survey in Harpswell, ME. (Photo: Maine Forest Service)

Parasitic flies, *Cyzenis albicans*, were released for the 3d year in Maine in cooperation with Dr. Joseph Elkinton, University of Massachusetts, and funded by the USDA. Flies were released in two towns in Cumberland County: Peaks Island-Portland (2,000 flies) and Two Lights State Park, Cape Elizabeth (2,000 flies). Locations where flies had been released in previous years were sampled for parasitoids.

Pine Leaf Adelgid

Pine leaf adelgid is a native adelgid that depends on eastern white pine and red or black spruce to complete its lifecycle. Impacts on spruce growth are limited, and occasionally impacts on white pine growth can be significant. In recent years populations have been building in parts of Maine; this has happened before. The 1968 Maine Agricultural Experiment Station Bulletin 658 reports on a waning outbreak of the pine leaf adelgid. The report states that radial growth impacts to eastern white pine began in 1955, and populations of the adelgid peaked in 1961 and were still declining in 1968 (Dimond and Bishop 1968).

The current buildup was first noticed in 2012 in the north end of Baxter State Park and was reported in the September issue of the Maine Forest Service's Conditions Report (http://www.maine.gov/dacf/mfs/publications/condition_reports.html). In 2015 public and natural resources professionals began to notice and report the pest over a wide area. Damage ranges from reddening and wilting of just a few shoots on individual trees, to widespread dieback of the majority of shoots on seedling and small pole-sized trees, as well as some pockets of mortality. Surveys in 2015 showed severe damage to white pine scattered over more than a quarter of a million acres of forest. Reports indicate that lighter damage covers an even broader extent. The most severe damage is confined to Piscataquis County in an area west of Baxter State Park.

We expect to see significant damage from this pest for years to come; the outbreak that began in the 1950's lasted more than 10 years.

Eastern white pine with severe damage from pine leaf adelgid in T6 R13 WELS, ME. (Photo: Maine Forest Service)

Other Insects Issues of Note

The year 2015 marked one more trapping and field season without detection of **emerald ash borer** (EAB) in Maine. That was not due to a lack of trying: 710 purple traps, 20 green funnel traps, 24 trap trees, and 25 biosurveillance sites were used in EAB monitoring in Maine in 2015. In addition, public education and awareness efforts have remained a key part of our detection strategy.

Two other invasive insects have been making an impact on our forests and communities in a very similar footprint to the winter moth presence in Maine—hemlock woolly adelgid and browntail moth.

Hemlock woolly adelgid is established in Maine forest hemlocks at least from Kittery to Camden—roughly one-third of the Maine coastline. Declining hemlocks can be found in many coastal peninsulas where warmer winter weather and drier soil conditions help speed decline. A new regional publication funded by a U.S. Forest Service grant, Managing hemlock in northern New England forests threatened by hemlock woolly adelgid and elongate hemlock scale, has recently been made available on the Forest Service Web site: http://www.na.fs.fed.us/pubs/detail.cfm?id=48646.

Browntail moth populations show signs of increase in many coastal communities. Winter web counts were moderate to high in small areas of Bath, Bowdoinham, Topsham, and West Bath (Sagadahoc County), and Brunswick and Freeport (Cumberland County), again in winter 2014 – 2015. Defoliation was mapped on only 90 acres in Cumberland County this spring in Freeport, but in September over 10,000 acres of defoliation by first instar larvae were mapped in Sagadahoc and Cumberland Counties. This level of fall defoliation has not been seen since the early 2000's. Winter web surveys will verify the size of the footprint of this now perennial problem. The concern is that expanding browntail moth populations combined with winter moth will have a severe impact on oak trees in the midcoast region.

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Forest Health Programs

State forestry agencies work in partnership with the U.S. Forest Service to monitor forest conditions and trends in their State and respond to pest outbreaks to protect the forest resource.

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